

REMARKS/ARGUMENTS

Reconsideration and withdrawal of the rejections of the present application are respectfully requested in view of the remarks presented herewith.

I. STATUS OF THE CLAIMS AND FORMAL MATTERS

Claims 1-4, 11 and 12 are pending in this application. Claims 5-10, 13 and 14 were withdrawn; claim 4 is objected to. Claims 1-3, 11 and 12 are rejected in the Final Office Action mailed on June 6, 2008.

It is submitted that the claims, herewith and as originally presented, are patentably distinct over the prior art cited in the Office Action, and that these claims were in full compliance with the requirements of 35 U.S.C. § 112. The amendments of the claims, as presented herein, are not made for purposes of patentability within the meaning of 35 U.S.C. §§§§ 101, 102, 103 or 112.

II. EXAMINER INTERVIEW

Applicants' representatives have conducted a telephonic interview with Examiner Chu on August 5, 2008 in which claims 1 and 11 and the Jan reference was discussed. Applicants argued that Jan disclosed metal wirings containing the additive of the via contact, which is in disclaimed in claims of the present application. Examiner Chu stated that the claims are given the broadest reasonable interpretation, and as such maintained the present invention is obvious in view of Jan.

Applicants conducted a subsequent telephonic interview with Supervisor Mr. Kenneth Parker. Mr. Parker explained that even though an application could claim a structure in which one layer contains an additive and an adjacent layer would not contain the additive, the USPTO would take the default position that the additive would inherently diffuse into an adjacent layer. Mr. Parker further explained that the USPTO would take this position unless there was support to the contrary in the application which would allow such a structure to be feasible.

III. RESPONSE TO REJECTIONS UNDER 35 U.S.C. §103(a)

Claims 1-3, 11 and 12 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 6,468,906 to Chan et al. (hereinafter "Chan") in view of U.S. Patent No. 6,861,758 to Jan (hereinafter "Jan").

The rejections are traversed as set forth below.

Amended claim 1 recites, *inter alia*:

“... at least two wiring layers, each formed in a wiring groove formed in a corresponding insulating film; and

a via contact embedded in a via hole formed in an insulating film formed between the at least two layers and made of a metal wiring material which is the same as that of the at least two wiring layers,

wherein the metal wiring material of the via contact contains an additive which is not contained in the metal wiring materials of the at least two wiring layers ...” (emphasis added)

Applicants agree with the Final Office Action of June 6, 2008 that states that “Chan et al. does not disclose an additive within the metal wiring of the via contact.” Therefore, Applicants will not further discuss Chan. Furthermore, Applicants submit that Jan does not teach or disclose the features of claim 1.

In light of the interviews conducted with Examiner Chu and Supervisor Mr. Parker, and consistent with the telephonic interview with Mr. Parker, Applicants wish to point out that the specification of the present application supports the structure recited in claims 1 and 11. In particular a structure where **the metal wiring material of the via contact contains an additive which is not contained in the metal wiring materials of the two wiring layers**. Specifically, support for claims 1 and 11 is shown in Figure 6 and paragraphs [0155] and [0159]. The application expressly discloses a first metal barrier 16 and a second metal barrier 21 between the via contact and the metal wiring layers. Also next to each metal barrier there are preventive diffusions film layers. Therefore Applicants submit that the application as claimed would not be obvious in view of Jan because the application supports having an additive of the via contact not being diffusing into the metal wiring layers. Therefore, Applicants respectfully submit that Jan does not teach or disclose the features of claims 1 and 11.

Specifically, in Figures 6-9 and column 4, lines 22-58 of Jan discloses:

A dielectric layer 134 having an opening 136 is provided on an electrically conductive layer 132 as shown in FIG. 6. Dopant 138 is implanted to the electrically conductive layer 132 “before” embedding a conductive material in the opening 136 as shown in FIG. 7. Then, the electrically conductive material 142 is embedded in the opening 136 as shown in FIG. 8. After that, a first doped region 140 and a second doped region 144 are formed by annealing.

Accordingly, Jan discloses that the additive implanted into the electrically conductive layer 132, which is a lower wiring, is diffused in the via provided on the electrically conductive layer 132, and then in the electrically conductive material 142, which is an upper wiring, provided on the via. In particular, column 4, lines 41-47, of Jan states:

“FIG. 9 shows first doped region 140 in electrically conductive layer 132 and second doped region 144 in electrically conductive material 142. First doped region 140 and second doped region 144 are formed by annealing electrically conductive layer 132 after dopant 138 has been implanted into electrically conductive layer 132. Dopant 138 is able to diffuse to form first doped region 140 and second doped region 144. One advantage of this embodiment is that current can flow in either direction through the structure of FIG. 9 without causing electromigration of the material which comprises electrically conductive layer 132 and electrically conductive material 142.”

In Jan, as shown in FIG. 9, the additive is included in the electrically conductive layer 132 and the electrically conductive material 142. Therefore, Jan cannot have the feature of the present invention “wherein the metal wiring of the via contact contains an additive which is not contained in the metal wiring materials of the at least two wiring layers.”

In addition, in Jan, the additive is diffused from the lower wiring to the upper wiring, therefore, the technical idea taught in Jan is allowing a via to surely contain an additive. There is no motivation to make a configuration in which the additive is not contained in the lower wiring and is contained in the via. Consequently, the feature of the present invention “wherein the metal wiring of the via contact contains an additive which is not contained in the metal wiring materials of the at least two wiring layers” cannot be attained even by combining Jan and Chan.

The Examiner rejects claim 11 as being unpatentable over Chan in view of Jan. However, claim 11 should not be rejected for the same reasons described as to claim 1.

Claim 11 recites "a via contact ... which contains an additive which is not contained in the first wiring material of the first wiring layer..." For the reasons stated above, Jan does not teach this feature or an additive not contained in a lower wiring but contained in a via contact.

Claims 2, 3 and 12 are dependent claims. Since the independent claims they depend from are not obvious from neither Chan nor Jan as set forth above, claims 2, 3, and 12 are not obvious, and hence, patentable. Claim 4, which was only objected to as being dependent on rejected claim 1, should also be patentable.

Based on the foregoing reasons, Applicants respectfully submit that independent claim 1 patentably distinguishes over Chan in view of Jan and is therefore allowable. Independent claim 11 is similar in scope to claim 1 and therefore is also allowable.

IV. DEPENDENT CLAIMS

The other claims are each dependent from one of the independent claims discussed above and are therefore patentable for at least the above-identified reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

CONCLUSION


In view of the foregoing amendments and remarks, all of the claims in this application are in condition for allowance and Applicants respectfully request early passage to issue of the present application.

In the event the Examiner disagrees with any of the statements appearing above with respect to the disclosures in the cited references, it is respectfully requested that the Examiner specifically indicate the portions of the reference, or references, providing the basis for a contrary view.

Please charge any additional fees incurred by reason of this response and not paid herewith to Deposit Account No. 50-0320.

Respectfully submitted,
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